

CLAIMS:

1. A laminated piezo-electric device comprising a pole-like laminate formed by alternately laminating piezo-electric layers and electrode layers in the direction of height, and a pair of outer electrode plates formed on the different side surfaces of said pole-like laminate, said two electrode layers neighboring each other with said the piezo-electric layer sandwiched therebetween being electrically connected at their side surfaces to the outer electrode plates which are different from each other;

wherein flexible protruded electrically conducting terminals are provided on the side surfaces of said pole-like laminate on where the outer electrodes are arranged, said flexible protruded electrically conducting terminals extending along the side surfaces of the electrode layers and being capable of following the stretching and contraction of said pole-like laminate in the direction of height thereof, and the electrode layers are joined to said outer electrode plates via said protruded electrically conducting terminals.

2. A laminated piezo-electric device according to claim 1, wherein a glass layer is formed on the side surfaces of said pole-like laminate on where the outer electrodes are arranged so as to cover the side surfaces of the piezo-electric layers, and the root portions of said protruded electrically conducting terminals are buried in said glass layer.

3. A laminated piezo-electric device according to claim 1, wherein said protruded electrically conducting terminals have a thickness B of not smaller than 1 μm but not larger than one-half the thickness of the piezo-electric layer.

4. A laminated piezo-electric device according to claim 1, wherein said protruded electrically conducting

terminals have a height of protrusion beyond the side surfaces of the pole-like laminate which is not smaller than 1/20 the thickness of the piezo-electric layer.

5 5. A laminated piezo-electric device according to claim 1, wherein said outer electrode plates have a thickness of not larger than 50 μm .

10 6. A laminated piezo-electric device according to claim 1, wherein said protruded electrically conducting terminals and said outer electrode plates are formed of a conductor which contains at least silver.

15 7. A laminated piezo-electric device according to claim 1, wherein an electrically conducting member for preventing local heat generation is provided on the outer surfaces of said outer electrode plates, and an electric current is supplied to the outer electrode plates through said electrically conducting member.

20 8. A laminated piezo-electric device according to claim 7, wherein said electrically conducting member is at least one selected from the group consisting of an electrically conducting sheet formed of an electrically conducting adhesive composition, an electrically conducting coil, an electrically conducting corrugated plate and an electrically conducting fiber aggregate.

25 9. A laminated piezo-electric device according to claim 2, wherein said protruded electrically conducting terminals are formed by applying an electrically conducting paste containing a glass powder and an electrically conducting metal powder onto the side surfaces of the pole-like laminate, followed by heating.

30 10. A laminated piezo-electric device according to claim 1, wherein spaces between the side surfaces of said pole-like laminate and the inner surfaces of said outer electrode plates are filled with an electrically conducting resin composition, and said outer electrode
35 plates are provided with grooves or slits.

11. A laminated piezo-electric device according to claim 10, wherein said grooves or said slits extend in the transverse direction of the outer electrode plates among the neighboring protruded electrically conducting
5 terminals.

12. An injection device comprising a container having an injection aperture, a laminated piezo-electric device of claim 1 contained in said container, and a valve for injecting a liquid through said injection aperture
10 being driven by said laminated piezo-electric device.

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